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# UNITED STATES AIR FORCE
# ARMSTRONG LABORATORY

## Advanced Aircrew Body Armor


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Over the past thirty years, significant technological improvements have been made in materials used for ballistic protection. Incorporations of this cutting edge body armor technology will pay off with reduced thermal burden, diminished aircrew fatigue, and increased human performance. A review of existing work done by the US Navy and US Army on body armor was completed. The US Army's Survival and Rescue Vest Integrated packets (SARVIP) program has completed the entire acquisition process and is in full scale development. Regarding the requirement for body armor, AFSOC chose to purchase off-the-shelf body armor that met their needs. AFSOC's special missions group assessed the US Army test and evaluation data, and the integration of off-the-shelf armor with SARVIP in the aircraft in which the crews would be flying. Armstrong Laboratory's Crew Technology Division (AL/CFT) recommended that the LPU-21/P/P be integrated with the SARVIP and engineering drawings were developed for attachment points on the vest. It was therefore concluded that the current commercially available body armor technology, used in combination with the US Army's SARVIP equipment, when modified as specified by AL/CFTS, will meet AFSOC requirements.

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A historical review and literature search was completed. The current aircrew body armor used by the US Air Force has not changed since the Vietnam conflict era. It is heavy, and not compatible with a long-range over water Special Operations Forces (SOF) mission. It does not provide multiple hit coverage and increases crew fatigue significantly when incorporated with life preserver unit, weapons, survival vest, chemical defense equipment and night vision goggles. With this significant increase in aircrew fatigue, cockpit or cabin duties become impossible. Physiologically, the poorly distributed weight of the current body armor affects blood flow to the lower body on extended flights and the bulk produces an increased thermal burden to the aircrew member. An advanced aircrew body armor system must integrate an aircrew survival vest, flotation and body armor system that provides hoist capability, survivable flotation, and gives ballistic protection. Over the past thirty years, significant technological improvements have been made in materials used for ballistic protection. With the incorporation of the improved ballistic protection and the concomitant decreases in weight and bulk, integration with the cockpit and aircrew personal protective equipment will be greatly enhanced. Incorporation of this cutting edge body armor technology will payoff with reduced thermal burden, diminished aircrew fatigue, and increased human performance, thereby enhancing SOF operational capability and reducing aircrew casualties.

A review of existing work done by the US Navy and US Army on body armor was completed. It was noted that the US Navy program, Aircrew Integrated Survival Armor Protection (AISAP), might meet the mission needs statement generated by the Air Force Special Operations Command (AFSOC). The US Navy program was in the early stages of development. The US Army program was not a body armor program but a survival vest program, the Survival and Rescue Vest Integrated Packets (SARVIP) program. The US Army's SARVIP program had completed the entire acquisition process and was in full scale development. SARVIP would be available to AFSOC through the military procurement system. Regarding the requirement for body armor, AFSOC chose to purchase off-the-shelf body armor that met their needs. AFSOC's special missions group assessed the US Army test and evaluation data, and the integration of the off-the-shelf body armor with SARVIP in the aircraft in which the crews would be flying. The Systems Research Branch of the Crew Technology Division (AL/CFTS) recommended that the US Navy's LPU 21/P equipment be considered as the life preserver to be integrated with the SARVIP vest and body armor system. Krug Life Sciences, Inc., the Crew Technology Division's in-house contractor, developed engineering drawings for attachment points on the SARVIP. These drawings were sent to the US Army Natick Research, Development, and Engineering Center, Natick MA for an engineering review. Mr. Eric Amhram, the SARVIP engineer, evaluated the concept and confirmed that the attachment points would support the LPU 21/P life preserver. This information along with the engineering drawings were provided to AFSOC. It was therefore concluded that the current commercially available body armor technology, used in combination with the US Army's SARVIP equipment when modified as specified by AL/CFTS, will meet the current AFSOC requirements.